1999, PASP (in press)

SPECTROSCOPY OF STELLAR-LIKE OBJECTS CONTAINED IN THE SECOND BYURAKAN SURVEY. I

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ABSTRACT

The results of spectroscopic observations of 363 star-like objects from the Second Byurakan Survey (SBS) are reported. This SBS's subsample has proven to be a rich source of newly identified quasars, Seyfert type galaxies, degenerate stars and hot subdwarfs. In the subsample here studied, we identified 35 new QSOs, 142 White Dwarfs (WDs) the majority of which, 114 are of DA type, 55 subdwarfs (29 of which are sdB-type stars), 10 HBB, 16 NHB, 54 G-type and 25 F-type stars, two objects with composite spectra, four Cataclismic Variables (CV), two peculiar emission line stars, 17 objects with continuous spectra, as well as one planetary nebula. Among the 35 QSOs we have found two Broad Absorption Line (BAL) QSOs, namely SBS 1423+500 and SBS 1435+500A. Magnitudes, redshifts, and slit spectra for all QSOs, also some typical spectra of the peculiar stars are presented. We estimate the minimum surface density of bright QSOs in redshift range $0.3 < z < 2.2$ to be 0.05 per sq. deg. for $B < 17\overset{m}{.}0$ and 0.10 per sq. deg. for $B < 17\overset{m}{.}5$.

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Subject headings: Quasars: redshifts, Stars: White Dwarfs, Stars: high galactic latitude.

1. INTRODUCTION

In the last two decades, several surveys have been undertaken primarily aimed to the detection of large samples of QSOs. A variety of techniques have been applied in attempts to select the small fraction of quasars among the samples of blue objects largely comprised of foreground stars with spectra that resemble, at a given spectral resolution, those of quasars. The objective prism surveys have been one of the most efficient selection methods applied. The SBS is one of such surveys, it was carried out for a defined area of the sky, in which both stellar and non-stellar objects were systematically selected.

The Second Byurakan Survey (SBS) is a low resolution objective prism survey with a limiting magnitude of $B \sim 19\overset{m}{.}5$. The survey covers 1000 square degrees contained within the limits defined by $07^h40^m < \alpha < 17^h15^m$, in right ascension and by $+49^\circ < \delta < +61^\circ$ in declination. The observing technique and the selection criteria for the SBS objects have been described by Markarian & Stepanian (1983), and Stepanian (1994). Worth mentioning is that the selection criteria of the SBS include the presence of a strong UV continua, emission lines, and/or peculiar energy distributions as inferred from the objective prism spectra. These criteria have been successful in selecting objects such as UVX galaxies (Markarian galaxies), as well as, a broad class of QSOs. As a by product, a large number of peculiar stars, WDs, composite and emission objects, hot subdwarfs and other types of objects are detected. The SBS catalog contains nearly 3500 objects, of which ~ 1700 are galaxies, and ~ 1800 are star-like objects.

One of the main goals of the SBS survey is to search and compile a complete sample of bright QSOs in the magnitude range $15\overset{m}{.}5 < B < 18\overset{m}{.}0$. Such sample is essential for determining the QSO's surface and space densities. It is important also for understanding the origin and evolution of quasars, for solving problems related to studies of the internal structure of QSOs. It is as well important for probing the early Universe through the analysis of absorption line systems formed along the line of sight. The latter requiring high spectral resolution, which is attainable only for the brighter QSOs.

During the last two decades in parallel with the SBS original survey we have been carrying out follow-up spectroscopic observations of selected objects from the SBS sample and still continue with it on the 6 m telescope of the Special Astrophysical Observatory

(SAO) in Russia. Observations of a few hundred objects have been carried out with the MMT (USA), with the 2.6m telescope of the Byurakan Observatory (Armenia), and with the 2.1 m telescope of the GHO (Cananea, Mexico). Historically, objective prism and color selected surveys have provided samples that help to answer some fundamental problems related to peculiar stars such as formation rates, space densities, lifetime, luminosity functions, etc. In this respect, the compilation of a data base of different classes of highly evolved stars at high galactic latitudes in a complete survey, that extends to fainter magnitudes and therefore, to larger distances, is very important.

So far, we have obtained slit spectra for about 850 SBS stellar-like objects. The data for nearly $\sim$ 270 QSOs, $\sim$ 100 Sy galaxies and $\sim$ 100 peculiar stars were published by Markarian et al.(1980 – 1987), Stepanian et al. (1990 – 1993) and Stepanian (1994).

In the present paper we report the results of spectroscopic observations of 363 relatively bright stellar objects from the SBS sample. The observational data were obtained at the Special Astrophysical Observatory (Russia) and Guillermo Haro Observatory (GHO) of the INAOE in Cananea (Mexico).The BV CCD photometric data for confirmed QSOs were obtained with the 1 m telescope at SAO (Chavushyan et al. 1995, 1999).

2. OBSERVATIONS AND DATA REDUCTION

Our spectroscopic observations have been carried out with the 6 m telescope of the SAO (Russia) and with the 2.1 m telescope of the GHO at Cananea, México, during the period of 1978-1997.

Spectral observations with the SAO 6 m telescope have been carried out since 1978. The Universal Astrophysical Grating Spectrograph (UAGS) in combination with an image tube UM-92 has been used in the first series of observations. The dispersion of the spectrograph was 90-100 Å/mm with a spectral resolution of 5-8 Å. Since 1984 the observations were carried out with the SP-124 spectrograph equipped with a 1024-channel photon counting system (IPCS) scanner (Drabek et al. 1985), installed at the Nasmith I focus. Later on the Long Slit Spectrograph (LSS) equipped with a 530×580 pixel CCD (Afanasiev at al. 1995), installed at the prime focus, was used. The adopted slit width was 2 arcsec with an effective instrumental spectral resolution of about 12 Å for the IPCS and about 15 Å for the LSS. The wavelength range covered was that of 3400 to 7100 Å . The data reduction procedures – cosmic ray hits removal, bias and flat field corrections, wavelength linearization and flux calibration – were carried out with the SAO standard method of IPCS data reduction (Afanasiev at al. 1991) and with the CCD data reduction

software packages developed at the SAO (Vlasyuk, 1993).

Observation with the 2.1 m GHO telescope were carried out with the Landessternwarte Faint Object Spetrograph (LFOSC) Zickgraff et al. (1997), installed in the Cassegrain focus. This instrument is equipped with a 600×400 pixel CCD. The adopted slit width was 2 arcsec, with the effective instrumental spectral resolution of about 11 Å in the wavelength range form 4000 Å to 7000 Å . The IRAF reduction packages were used for data reduction and flux calibration.

3. THE RESULTS

The journal of observations is presented in Table 1. The following information is listed in consecutive columns: 1 – the SBS designation, 2-3 – the coordinates for the 1950.0 epoch measured by Bicay et al.(1999) with an accuracy of about ~ 1 arcsec, 4 – an eye estimated m_{pg} magnitude, given with an accuracy of about $\pm 0\overset{m}{.}5$ (Stepanian, 1994). For some objects the photometric B magnitudes with two decimals are given, those should have a probable error of $0\overset{m}{.}05$, (Chavushyan et al. 1995, 1999), 5 – the spectral type, 6 – date of observation, 7 – exposure time, 8 – instrument used, 9 – an alternative designation of the object when available.

The numbers in the present subsample of SBS stellar objects of different spectral types are given in Table 2.

In classifying the detected white dwarfs and subdwarfs, we have adopted the classification scheme developed by Sion et al. (1983), Green et al. (1986) and Berg et al. (1992). The spectral characteristics associated with the types adopted in our paper are listed by Berg et al. (1992). Furthermore, in order to achieve a uniform classification scheme for the objects repoted here, we have obtained slit spectra of known objects contained in some previous studies such as PHL (Palomar-Haro-Luyten), PG (Palomar-Green), LB (Luyten-Blue), and also of some other bright objects with previously well determined spectral types which are contained in the SBS. We suspect that the subsample of objects classified here as "Continuum spectrum" (Cont) is composed by a mixture of both BL Lac objects and DC stars.

Table 3 lists the observed emission lines and redshifts for the 35 new QSOs. The redshifts were determined from the strongest emission lines. The mark ":" refers to the ambiguous emission line determination. The redshifts of the detected quasars fall in the interval defined by $z = 0.1$ and $z = 2.32$.

Plots of spectra of the QSOs and of some typical high latitude blue stars are presented in Figures 1 to 4. For the sake of homogeneity, we plotted there relative intensities versus wavelength.

4. CONCLUSIONS

The subsample of stellar-like objects contained in the SBS catalogue has shown to be a rich source of new QSOs, degenerate stars and hot subdwarfs. In the present paper, the spectral classification of 363 studied objects was made. Thirty five new QSOs, 142 WD most of which (114) are DA white dwarf stars, 55 subdwarfs (of which 29 are sdB-type), 10 HBB, 16 NHB, 54 G and 25 F-type stars, two objects (SBS 0834+576 and SBS 1309+544) have composite spectra, four cataclismic variables (CV), two peculiar emission line stars, 17 objects with continuous spectra, as well as one planetary nebula were identified. A detail investigation of the latter object is under way.

Worth mentioning is that two of the detected QSOs, SBS 1423+500 and SBS 1435+500A, are clearly BAL QSOs. While SBS 1201+517 may also be a BAL QSO, since a broad absorption component of MgII (λ 2798 Å) emission line in its spectrum is suspected. Two very strong absorption lines at λ 4463 Å (perhaps CIV in self absorption) and at λ 4015 Å are evident in the spectrum of SBS 0937+503.

From visual inspection of the POSS, six stars in our sample, namely – SBS 0958+532 (DAF:), SBS 1017+533 (CV), SBS1040+493 (sd), SBS 1050+582 (DA), SBS 1103+586 (DA) and SBS 1300+523 (DAB) have very close companions and are probably binary systems.

The vast majority of star-like objects selected in SBS survey have turned out to be WDs, subdwarfs and F and G type stars. The most numerous subset of stars found are DA WDs.

Thus far, the spectroscopy of the subsample of stellar-like objects contained in the SBS, has confirmed the nature of more than 300 new QSOs, one third of which are brighter than $B < 17\overset{m}{.}5$. This allow us to estimate a absolute lower limit to the cumulative surface density of bright QSOs in the most complete range of redshifts ie. $0.3 < z < 2.2$. The most reliable values for the lower limit of bright QSOs in redshift range $0.3 < z < 2.2$ corresponds to 0.05 per sq. deg. for $B < 17\overset{m}{.}0$, and 0.10 per sq. deg. for $B < 17\overset{m}{.}5$.

The detailed analysis of the surface and spatial densities of QSOs, and of different types of selected peculiar stars, will be carried out once we finish the spectroscopy of the

entire sample of star-like objects contained in the SBS catalogue.

We are grateful to V. Vlasyuk, A. Burenkov for allowing us to use their data analysis package and for assisting us at the 6 m telescope. We thank J.R. Valdés for helping us with observations and J. Miramón, G. Miramón, R. Gonzáles and S. Noriega for excellent assistance and technical support at the 2.1m GHO telescope. Finally, we thank N. Serafimovich for help in preparing the present paper. This work has been partially supported by CONACYT research grants No. 28499-E, 211290-5-1430PE, and 211290-5-0009PE. JAS, VHCh, LKE were partially supported by the research grants No. 97-02-17168 and 1.2.2.2 from the Russian Foundation for Basic Research and from the State Programm "Astronomy" respectively.

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Fig. 1.— Plots of the spectra of QSOs observed with the 6 m telescope. The vertical axis represents the relative flux the absissae represents the wavelength in Å

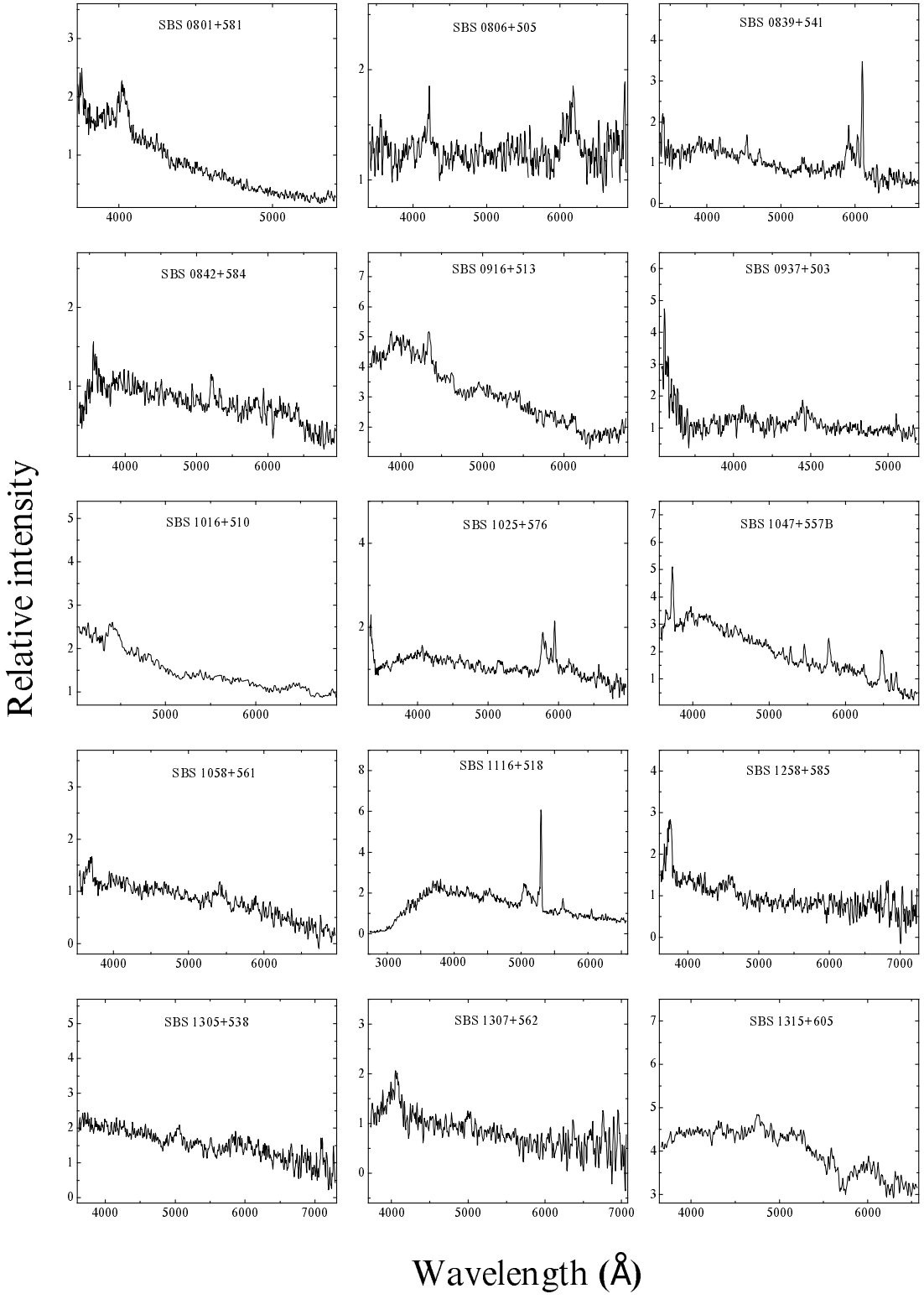

Fig. 1.— Continued

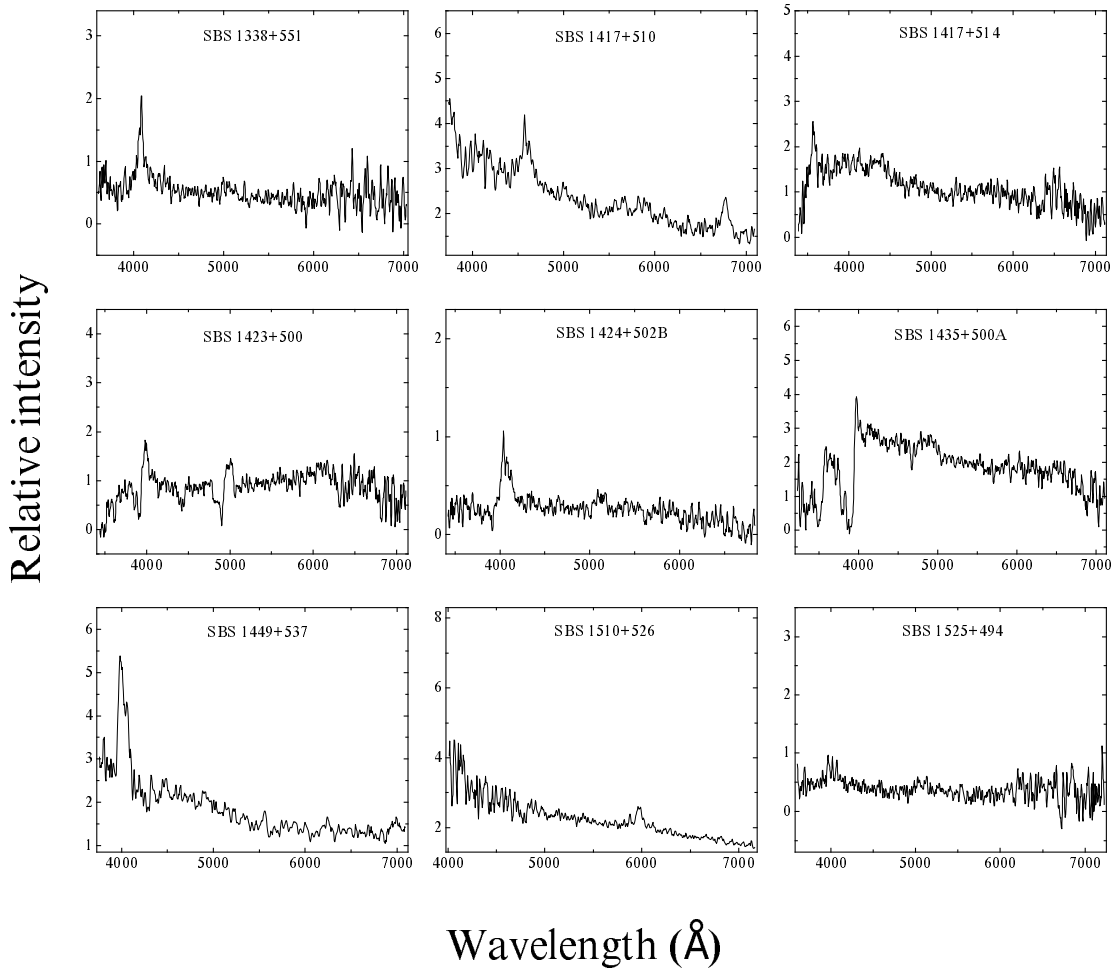

Fig. 2.— Plots of the spectra of stars observed with the 6 m telescope.The vertical axis represents the relative flux the absissae represents the wavelength in Å

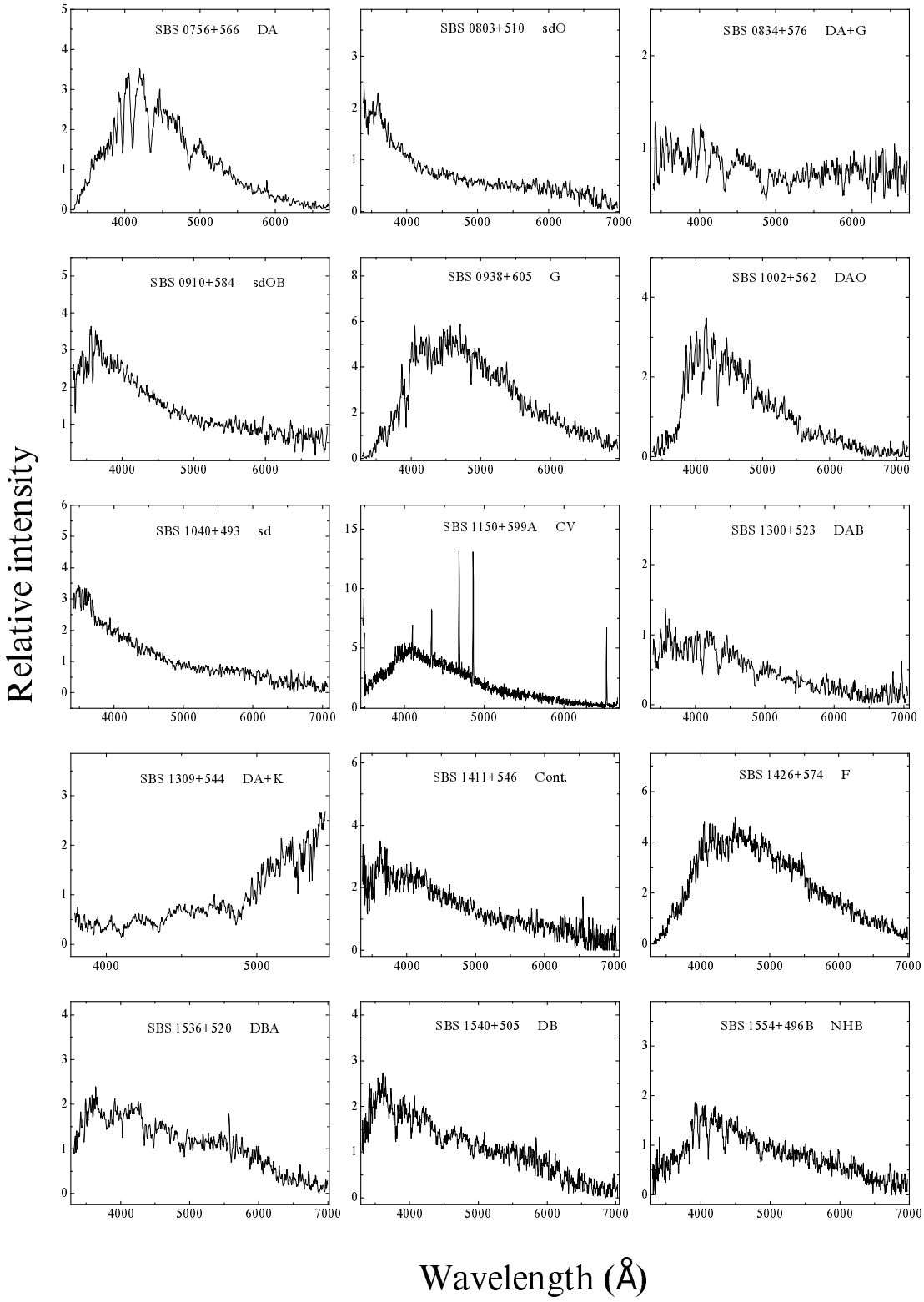

Fig. 3.— Plots of the spectra of QSOs observed with the 2.1 m telescope.The vertical axis represents the relative flux the absissae represents the wavelength in Å

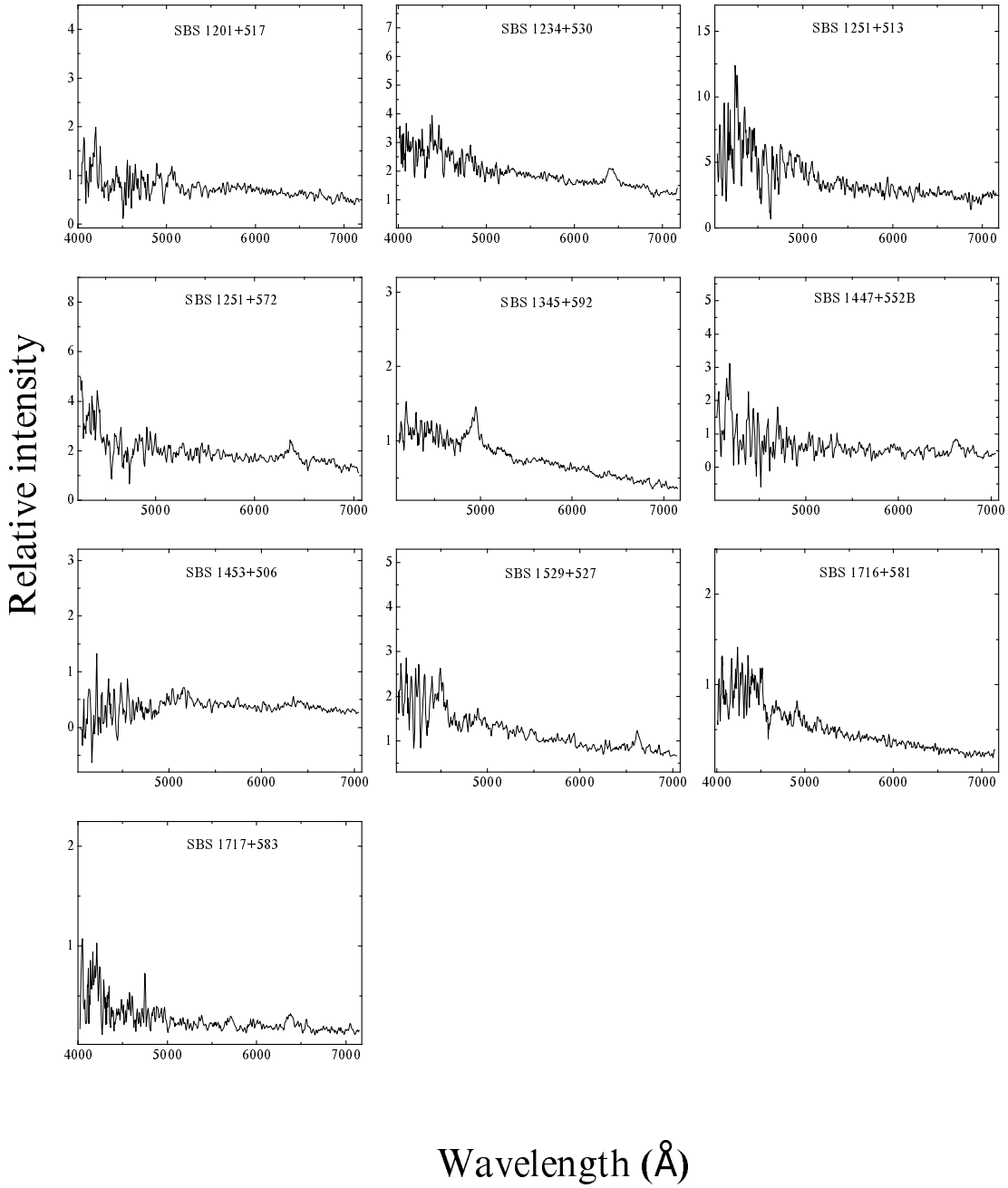

Fig. 4.— Plots of the spectra of stars observed with the 2.1 m telescope.The vertical axis represents the relative flux the absissae represents the wavelength in Å

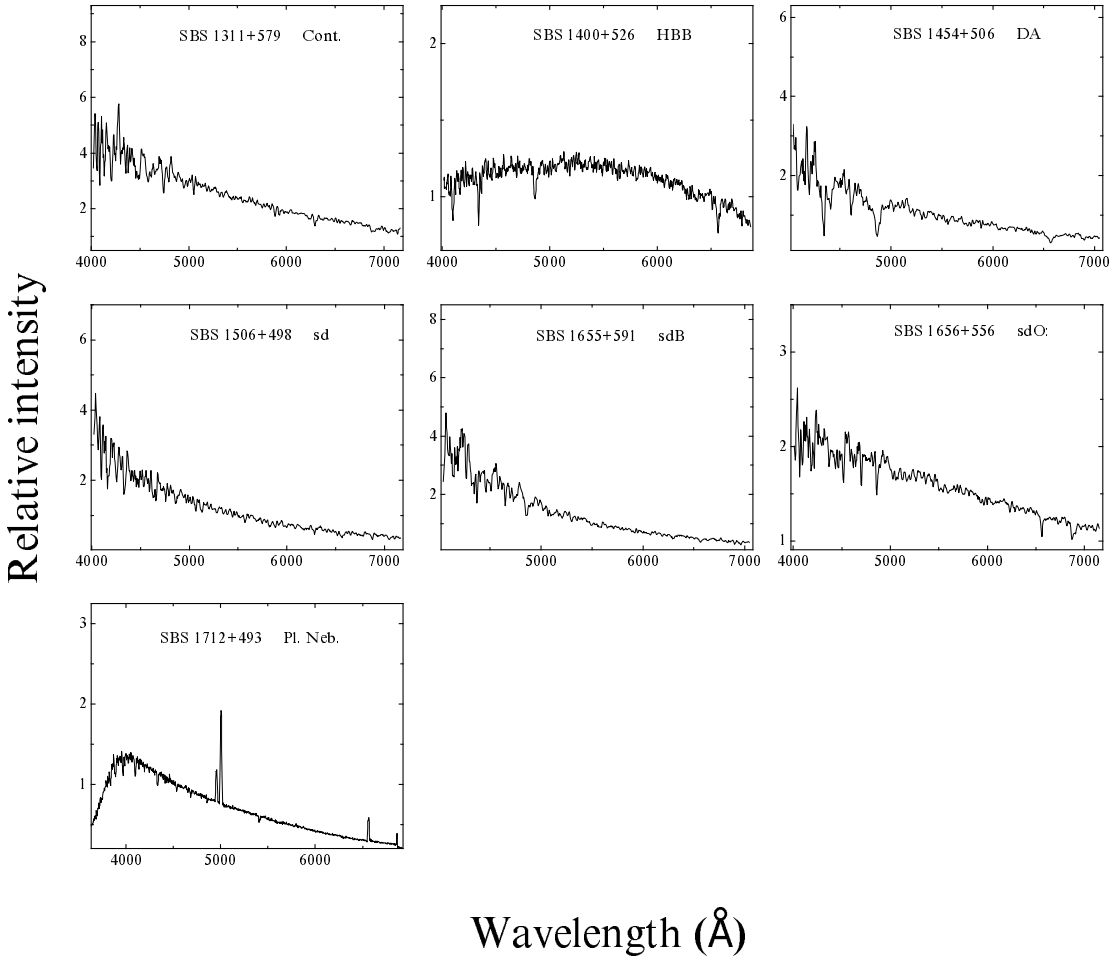

Table 1. Journal of Observations

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
0749+590	07 49 10.34	+59 02 27.5	16.0	DA	07.02.83	420	I	
0749+583	07 49 35.34	+58 22 50.6	17.5	G	02.11.91	600	II	Mkn 381
0750+581	07 50 24.97	+58 06 17.8	17.5	DAF	14.01.93	879	II	
0753+610A	07 53 08.89	+61 02 17.6	17.5	G	25 11 81	600	I	
0755+600	07 55 11.93	+60 02 02.6	17.5	CV	25.11.81	960	I	
0755+515	07 55 46.58	+51 34 48.7	17.0	NHB	25.02.92	407	II	
0756+508	07 56 18.91	+50 50 40.7	17	G	13.04.96	1200	IV	
0756+581	07 56 32.40	+58 10 50.2	16.5	sdB	14.01.93	583	II	
0756+566	07 56 32.74	+56 41 51.2	17.0	DA	16.11.90	414	II	
0759+608	07 59 20.79	+60 53 54.1	18.0	DA:	25.11.81	840	I	
0759+610	07 59 21.51	+61 02 12.0	18.0	sdB	25.11.81	840	I	
0800+491	08 00 41.15	+49 09 08.6	11.0	NHB	06.11.91	2297	II	
0801+537	08 01 29.66	+53 43 33.9	17.0	F	16.11.90	900	II	
0801+581	08 01 35.73	+58 11 35.2	17	QSO	14.01.93	745	II	
0803+510	08 03 16.13	+51 03 57.9	16.0	sdO	09.04.91	148	II	
0804+590	08 04 11.37	+59 01 07.5	18.5	sdB	25.11.81	960	I	
0806+505	08 06 20.26	+50 34 30.2	17.01	QSO	07.11.91	457	II	RGBJ0810+504[§]
0809+566	08 09 41.39	+56 36 14.1	14.0	DA	04.02.89	300	II	
0809+593	08 09 53.82	+59 22 08.3	17.5	DA	25.11.81	480	I	
0810+524	08 10 19.80	+52 26 22.1	17.5	DA	09.04.91	236	II	
0811+582A	08 11 10.23	+58 12 43.3	18.0	Cont	25.11.81	480	I	
0811+513	08 11 31.10	+51 22 25.6	17.5	Cont	09.04.91	358	II	
0811+582B	08 11 43.45	+58 12 47.9	18	NHB	08.02.97	1200	III	
0818+498	08 18 42.08	+49 52 23.2	17.5	DA:	08.11.91	252	II	
0821+602	08 21 00.35	+60 13 44.1	16.5	DA	09.04.91	265	II	
0822+552	08 22 41.31	+55 15 45.6	16.5	G	22.02.87	340	II	
0825+591	08 25 54.46	+59 06 51.7	17.5	DA	09.10.88	540	II	
0825+568	08 25 54.68	+56 51 17.2	17.0	sdO:	09.04.91	244	II	
0826+569	08 26 39.84	+56 55 08.0	17.0	DB	07.11.91	230	II	
0828+490	08 28 57.53	+49 02 13.8	17.0	sdB	08.11.91	162	II	
0829+559	08 29 42.74	+55 57 46.9	16.5	DB:	08.11.91	453	II	
0830+537	08 30 35.96	+53 46 34.3	16.5	DA	29.03.87	400	II	
0832+536	08 32 58.55	+53 39 02.3	16.0	CV	30.12.86	340	II	
0833+491	08 33 34.18	+49 07 27.7	15.5	DAF	06.11.91	2297	II	
0834+576	08 34 34.81	+57 37 22.1	16.5	DA+G	09.04.91	173	II	
0836+533	08 36 40.48	+53 21 33.1	15.5	DA	04.02.89	200	II	
0838+563	08 38 46.24	+56 18 07.0	16.0	sdB	04.02.89	340	II	
0839+541	08 39 29.41	+54 08 07.2	16.96	QSO	08.04.91	377	II	
0841+565	08 41 55.42	+56 33 14.0	17.0	Cont	08.11.91	605	II	
0842+572	08 42 10.83	+57 14 28.5	17.0	DA	09.04.91	280	II	
0842+584	08 42 28.75	+58 27 53.7	18	QSO	17.02.94	1232	II	
0851+586	08 51 13.56	+58 36 59.7	17.5	G	10.11.91	587	II	
0853+506	08 53 02.09	+50 39 21.2	17.0	sd:	07.11.91	196	II	
0856+508	08 56 12.01	+50 52 33.2	17.0	sd	07.11.91	208	II	
0902+561	09 02 25.56	+56 09 31.1	15.5	DA	05.02.89	300	II	
0904+566	09 04 39.77	+56 37 32.5	17.0	G	07.11.91	215	II	
0905+549	09 05 51.52	+54 58 07.6	16.5	sdB	08.02.89	340	II	
0906+532	09 06 06.09	+53 16 25.1	15.0	sdB	25.02.88	300	II	
0906+552	09 06 57.66	+55 17 41.3	15.5	DA	05.02.89	300	II	
0910+584	09 10 47.66	+58 25 04.9	17.0	sdOB	07.11.91	195	II	
0911+527	09 11 36.43	+52 44 22.9	17.0	DA:	10.11.91	169	II	
0913+545	09 13 31.49	+54 30 50.8	11.0	HBB	25.05.88	120	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
0914+546	09 14 59.12	+54 40 59.1	13.0	DAB	22.02.87	150	II	
0916+513	09 16 29.83	+51 18 53.2	16.33	QSO	07.11.91	176	II	NGC 2841 UB3
0919+529	09 19 22.29	+52 57 43.8	16.0	DA	05.03.92	192	II	
0920+597	09 20 18.66	+59 44 22.0	17.5	DA	15.11.79	420	I	
0920+544	09 20 27.88	+54 27 28.1	16.5	F:	08.11.91	974	II	
0921+547	09 21 21.31	+54 47 19.7	16.5	DA	08.11.91	508	II	
0926+498	09 26 27.73	+49 49 24.2	17.0	DB	05.03.92	294	II	
0926+581	09 26 59.77	+58 09 46.1	17.5	G	08.01.92	434	II	
0927+540A	09 27 04.69	+54 04 09.1	17.5	F	27.03.87	540	II	
0927+575	09 27 10.59	+57 34 38.5	17.5	NHB	08.01.92	707	II	
0927+540B	09 27 26.10	+54 03 47.5	16.5	F	27.03.87	500	II	
0928+559	09 28 26.21	+55 55 52.9	16.0	G	22.02.87	480	II	
0929+593	09 29 12.79	+59 19 16.1	17.5	G	08.01.92	344	II	
0929+556	09 29 34.12	+55 39 41.6	16.5	G:	08.11.91	679	II	
0933+579	09 33 24.87	+57 58 55.1	17.5	G	08.01.92	1219	II	
0933+515	09 33 59.58	+51 31 27.7	17.5	G:	08.01.92	423	II	
0934+590	09 34 12.80	+59 04 43.5	17.5	G	08.01.92	300	II	
0934+499	09 34 34.64	+49 55 22.5	17.0	DA	10.02.86	320	II	
0936+495	09 36 52.10	+49 34 39.3	18.5	DA	10.02.86	900	II	
0937+583	09 37 05.67	+58 23 27.6	17.5	G	08.01.92	329	II	
0937+510	09 37 06.87	+51 01 29.8	18.0	sd	10.11.85	900	II	
0937+503	09 37 31.42	+50 22 57.0	18.5	QSO	06.04.86	960	II	
0937+552	09 37 48.98	+55 13 46.6	18.5	F	17.03.80	960	I	
0937+519	09 37 57.95	+51 56 42.5	17.5	DG	10.02.86	480	II	
0938+533	09 38 06.37	+53 22 25.3	18.0	G	17.03.80	600	I	
0938+550A	09 38 35.01	+55 00 13.0	18.0	DA	17.03.80	660	I	
0938+605	09 38 35.22	+60 30 15.8	17.5	G	06.04.91	197	II	
0938+577	09 38 38.83	+57 47 24.1	17.5	DA	14.11.79	380	I	
0938+573	09 38 56.66	+57 18 45.9	17.0	G	10.11.91	513	II	
0939+548	09 39 14.24	+54 49 06.9	18.0	G	17.03.80	780	I	
0940+534	09 40 16.08	+53 29 21.0	18.5	DA	17.03.80	900	I	
0940+512A	09 40 51.68	+51 12 32.7	18.0	G	05.04.86	840	II	
0941+537	09 41 17.52	+53 42 40.5	17.5	G	17.03.80	540	I	
0941+551	09 41 31.36	+55 08 40.3	17.5	DA	03.01.78	720	I	
0941+558	09 41 41.31	+55 48 39.9	12.0	DAF:	05.02.89	120	II	
0941+514	09 41 55.73	+51 27 23.9	18.5	DAO	14.02.86	900	II	
0942+507	09 42 18.55	+50 44 28.5	19.0	DAO	13.02.86	960	II	
0942+527B	09 42 51.17	+52 47 34.0	18.5	DA:	29.11.87	900	II	
0943+507A	09 43 11.37	+50 42 07.1	14.5	G	15.12.87	300	II	
0943+603	09 43 17.24	+60 20 16.7	17.5	DA	15.11.79	600	I	
0943+592	09 43 48.45	+59 13 18.3	17.0	G	10.11.91	257	II	
0944+506	09 44 14.28	+50 38 40.0	18.0	DA	10.02.86	780	II	
0944+560	09 44 59.91	+56 01 06.7	18.0	DAF:	17.03.80	780	I	
0945+578	09 45 21.99	+57 53 57.4	17.5	DA:	08.01.92	665	II	
0946+501B	09 46 48.11	+50 09 50.6	17.0	DA	10.02.86	640	II	
0947+549	09 47 15.97	+54 55 33.0	18.0	sd:	17.03.80	800	I	
0948+513	09 48 10.41	+51 23 52.0	18.5	sd	26.11.87	860	II	
0948+550	09 48 17.30	+55 04 26.7	17.0	F	10.11.91	421	II	
0948+505	09 48 24.95	+50 31 21.1	18.0	DBA	10.02.86	800	II	
0949+554	09 49 39.49	+55 25 54.1	16.0	F	19.03.80	540	I	
0950+579	09 50 07.23	+57 56 07.5	16.5	sdB	10.11.91	227	II	
0950+562	09 50 34.51	+56 12 02.7	19.0	DA	28.12.84	900	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
0950+568	09 50 39.47	+56 48 48.9	17.5	G	08.02.83	780	I	
0950+575	09 50 47.40	+57 33 51.4	17.0	G	08.01.92	292	II	
0951+591	09 51 26.40	+59 07 46.3	16.5	G	08.01.92	325	II	
0951+497	09 51 45.83	+49 42 50.6	18.0	G	10.10.88	860	II	
0953+574	09 53 14.84	+57 27 41.4	17.5	DA	06.04.91	294	II	
0953+509	09 53 16.87	+50 56 41.3	18.0	G	09.03.88	860	II	
0955+606	09 55 13.14	+60 36 08.8	16.5	DAF	08.01.92	1141	II	
0955+524	09 55 27.99	+52 29 19.7	18.0	Cont	27.11.87	800	II	
0956+540	09 56 07.53	+54 00 53.4	17.0	G:	16.03.80	600	I	
0956+492	09 56 10.26	+49 12 47.7	17.5	sdB	27.11.87	320	II	
0957+513	09 57 03.20	+51 18 29.5	17.5	sdB	10.02.86	360	II	
0957+553	09 57 21.35	+55 21 21.9	17.0	F	16.03.80	600	I	
0957+551	09 57 57.62	+55 06 05.3	17.5	DAF:	16.03.80	720	I	
0958+532	09 58 06.50	+53 15 41.7	18.0	DAF:	16.03.80	780	I	
0958+610	09 58 30.43	+61 03 36.8	16.5	DA	29.02.92	274	II	
0958+580	09 58 56.06	+58 04 40.4	17.5	G	06.04.91	252	II	
1001+559	10 01 27.00	+55 58 33.1	17.0	G	16.03.80	780	I	
1002+562	10 02 47.56	+56 15 21.4	17.0	DAO	22.02.90	360	II	
1003+606	10 03 51.36	+60 41 38.7	16.5	G	09.01.92	237	II	
1004+598	10 04 21.39	+59 52 30.3	16.5	G	14.11.79	360	I	
1004+572	10 04 21.81	+57 17 03.5	17.5	F	09.04.91	523	II	
1005+584	10 05 04.56	+58 24 35.7	17.5	G	09.04.91	188	II	
1006+599A	10 06 51.00	+59 54 40.0	17.0	G	09.04.91	171	II	
1006+578B	10 06 58.66	+57 52 35.5	16.5	G	14.11.79	600	I	
1009+538	10 09 11.55	+53 48 51.4	17.5	DA	04.02.92	540	II	
1009+585	10 09 58.60	+58 34 34.8	16.5	sdB	09.04.91	194	II	
1013+565	10 13 18.74	+56 30 18.6	18.0	Pec *	10.11.91	472	II	
1015+532	10 15 20.14	+53 12 11.1	16.0	F	05.03.92	468	II	
1016+510	10 16 07.16	+51 01 01.4	17	QSO	03.12.95	1200	III	
1016+563A	10 16 09.23	+56 18 34.9	17.5	DA:	04.02.92	560	II	
1016+527	10 16 11.90	+52 47 07.5	16.5	DA	05.03.92	973	II	
1017+533	10 17 14.66	+53 19 39.7	17.0	CV	26.02.88	540	II	
1018+601	10 18 56.21	+60 07 12.9	17.5	G	09.04.91	362	II	
1020+562	10 20 22.33	+56 12 06.6	18.0	G	07.11.91	364	II	
1020+553A	10 20 22.81	+55 21 15.7	16.5	G	10.11.91	248	II	
1021+562	10 21 38.30	+56 13 47.6	18.02	NHB	07.11.91	191	II	
1022+594	10 22 40.84	+59 29 40.9	17.5	DB	14.11.79	660	I	
1025+576	10 25 59.96	+57 39 15.5	17	QSO	17.02.94	1800	II	
1026+560	10 26 48.89	+56 02 29.7	18.0	DA	07.03.88	720	II	
1027+500	10 27 12.45	+50 00 44.3	16.5	sd	10.11.91	212	II	
1029+537	10 29 02.04	+53 45 03.3	13.5	DA	23.03.87	180	II	
1029+526	10 29 08.84	+52 36 49.0	16	sd	15.04.96	1200	IV	
1033+571	10 33 29.72	+57 07 00.6	17.39	QSO	10.11.91	210	II	
1034+496	10 34 23.80	+49 41 17.2	16.5	sd:	10.11.91	239	II	
1034+557	10 34 56.52	+55 46 58.0	17.0	DA	09.01.92	231	II	
1035+541	10 35 57.60	+54 10 28.5	17.5	DA	09.01.92	251	II	
1036+550	10 36 22.15	+55 05 53.3	17.5	DA	09.01.92	252	II	
1040+493	10 40 11.87	+49 18 07.1	16.5	sd	29.02.92	277	II	
1040+520	10 40 48.77	+52 00 54.1	17.5	DA	09.01.92	217	II	
1043+569	10 43 48.09	+56 59 47.2	17.5	F	04.02.92	660	II	
1045+570	10 45 15.66	+57 03 29.4	17.5	DA	09.01.92	507	II	
1047+557A	10 47 26.47	+55 42 25.6	17.0	DA	03.03.87	540	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
1047+557B	10 47 51.85	+55 43 18.3	17.17	QSO	17.02.94	711	II	
1049+541	10 49 10.46	+54 07 31.0	16.0	DA	22.04.87	360	II	
1050+582	10 50 51.49	+58 16 26.1	17.0	DA	06.04.91	220	II	
1051+556	10 51 48.63	+55 39 08.8	16.5	DA:	10.11.91	114	II	
1053+561	10 53 26.66	+56 11 16.1	17.5	sd	09.01.92	343	II	
1056+516A	10 56 20.09	+51 40 48.9	15.5	Cont	10.11.91	286	II	
1057+556	10 57 31.09	+55 38 47.0	17.5	Cont	08.01.91	540	II	
1058+570	10 58 10.81	+57 05 31.5	17.5	DA	25.02.88	660	II	
1058+561	10 58 38.79	+56 08 18.2	18.84	QSO	17.02.93	1272	II	
1058+559	10 58 51.56	+55 54 04.6	16.0	DA	27.12.89	500	II	
1059+568	10 59 23.36	+56 51 26.0	16.5	DA:	09.01.92	324	II	
1101+525	11 01 18.91	+52 30 46.3	17.5	DA	08.01.92	508	II	
1102+558	11 02 51.61	+55 52 19.8	17.0	F	08.01.92	423	II	
1103+595	11 03 00.40	+59 33 49.2	17.5	Cont	13.03.85	660	II	
1103+511	11 03 38.35	+51 09 17.6	17.5	DAB:	09.01.92	176	II	
1103+586	11 03 38.48	+58 41 08.2	17.5	DA	09.01.92	269	II	
1107+603	11 07 11.20	+60 18 00.1	18.0	Cont	13.03.85	780	II	
1108+506	11 08 06.81	+50 37 14.0	17.0	sdB	09.01.92	620	II	
1108+540	11 08 46.12	+54 04 10.3	17.0	DA	03.01.78	660	I	
1112+572	11 12 34.25	+57 17 46.6	17.0	DA	13.01.78	600	I	
1113+554B	11 13 54.05	+55 27 50.1	17.0	DA	04.02.92	540	II	
1116+518	11 16 49.04	+51 49 41.9	16.98	QSO	26.04.87	600	II	
1124+612	11 24 05.11	+61 17 21.1	17.5	DA	08.02.83	660	II	
1125+558	11 25 05.05	+55 51 53.6	16.5	DB	29.02.92	590	II	
1125+596	11 25 15.52	+59 36 28.2	16.5	DA	13.01.78	540	I	
1127+512	11 27 09.68	+51 16 33.1	17.0	sdO:	05.03.92	597	II	
1128+499	11 28 16.17	+49 54 59.9	16.0	DA	29.02.92	242	II	
1131+521	11 31 13.87	+52 08 40.3	17.0	DA:	05.03.92	325	II	
1133+489	11 33 27.49	+48 59 55.7	16.5	sdOB	29.02.92	252	II	
1139+583	11 39 53.94	+58 22 28.0	18.5	G	25.11.81	780	I	
1142+570	11 42 53.63	+57 00 26.4	14.5	HBB	22.04.87	220	II	
1144+603	11 44 12.11	+60 20 16.2	18.0	F	25.11.81	720	I	
1144+599	11 44 51.61	+59 55 59.9	17.0	DA	13.01.78	660	I	
1148+564	11 48 00.01	+56 25 27.1	15.0	DA	28.03.87	300	II	
1149+598	11 49 03.63	+59 51 14.7	18.5	Cont	29.03.86	900	II	
1149+560	11 49 33.46	+56 04 48.1	16.0	DAF:	28.03.87	400	II	
1149+509	11 49 57.05	+50 56 37.8	15.0	DA:	09.04.91	280	II	
1150+599A	11 50 47.02	+59 56 38.5	17.5	CV	04.04.86	660	II	
1151+587	11 51 58.87	+58 46 37.9	17.0	DBA	13.01.78	540	I	
1154+555	11 54 19.52	+55 34 20.7	16.0	HBB	29.03.87	420	II	
1154+583A	11 54 30.32	+58 21 21.1	18.0	DA	04.04.86	720	II	
1154+514	11 54 47.37	+51 26 54.5	16.5	DA	25.03.92	600	II	
1154+561	11 54 53.74	+56 11 50.6	16.5	G	29.03.89	600	II	
1155+594	11 55 52.75	+59 26 08.4	17.0	DA	13.01.78	600	I	
1158+597	11 58 10.20	+59 42 40.3	17.5	DB	13.01.78	420	I	
1158+538	11 58 36.65	+53 53 46.4	18.66	QSO	13.01.78	900	I	
1158+599	11 58 58.92	+59 57 17.7	17.5	DA	13.12.85	600	II	
1200+589A	12 00 40.49	+58 57 12.8	17.0	F	04.04.86	540	II	
1201+517	12 01 00.31	+51 46 56.8	17.24	QSO	06.03.97	2400	IV	
1203+587	12 03 19.86	+58 46 40.9	18.5	DA	04.04.86	780	II	
1204+560	12 04 23.47	+56 03 29.6	17.0	DA	06.04.91	295	II	
1210+511	12 10 00.26	+51 10 43.2	17.0	sd	25.02.92	742	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
1210+537B	12 10 28.56	+53 43 37.4	18.0	sdB-O	16.03.80	720	I	
1215+552	12 15 49.03	+55 14 47.0	19.5	Cont	27.12.84	900	II	
1216+522	12 16 38.32	+52 12 10.9	17.5	F	19.05.93	660	II	
1216+610	12 16 57.86	+61 01 19.8	17.5	G	11.04.91	258	II	
1217+490	12 17 06.98	+49 02 13.1	17	NHB	12.03.97	3600	IV	
1217+559B	12 17 55.22	+55 59 47.2	18.0	F	19.02.82	720	I	
1218+538	12 18 56.34	+53 53 59.9	19.5	sd	20.02.82	900	I	
1221+537	12 21 12.02	+53 45 07.1	19.0	DA	17.03.86	960	II	
1223+533A	12 23 14.95	+53 18 52.6	18.5	F:	22.02.82	900	I	
1224+569	12 24 55.39	+56 55 02.0	19.0	DA	20.02.82	900	I	
1226+570	12 26 22.38	+57 01 36.1	18.5	sdB	20.02.82	780	I	
1227+553	12 27 15.19	+55 22 49.7	16.5	Cont	16.03.80	540	I	
1228+551	12 28 15.22	+55 07 33.1	18.0	F:	19.02.82	780	I	
1229+580	12 29 52.54	+58 03 41.7	17.0	DA	11.04.91	140	II	
1231+494	12 31 13.05	+49 27 00.5	16.5	sdB	16.04.96	900	IV	
1233+523	12 33 20.92	+52 22 42.5	17.0	DA	25.03.92	660	II	
1234+530	12 34 19.72	+53 05 13.4	16.5	QSO	12.03.97	2400	IV	
1239+508	12 39 37.75	+50 52 27.8	16.5	DA	05.03.92	566	II	
1240+507	12 40 45.24	+50 43 52.6	17.0	sdB	02.04.92	660	II	
1241+562	12 41 24.64	+56 12 30.5	17.5	G	07.03.88	720	II	
1241+586	12 41 54.34	+58 40 17.0	17.5	DAO	11.04.91	280	II	
1244+566	12 44 31.49	+56 36 24.5	17.0	DA	11.04.91	160	II	
1245+567	12 45 14.78	+56 46 21.7	16.5	sd	11.01.91	207	II	
1247+568	12 47 04.63	+56 48 35.9	17.5	DA	11.04.91	230	II	
1251+572	12 51 14.65	+57 17 32.8	17.83	QSO	11.04.97	3600	IV	
1251+513	12 51 24.76	+51 18 20.1	16	QSO	16.04.96	1200	IV	
1251+586	12 51 51.32	+58 36 03.0	18.0	DA	14.05.85	780	II	
1257+609	12 57 34.73	+60 55 08.7	16.5	sdB	05.03.92	233	II	
1258+585	12 58 11.30	+58 32 04.6	18.0	QSO	18.05.93	1314	II	
1300+523	13 00 24.33	+52 23 19.4	16.0	DAB	05.03.92	144	II	
1300+514	13 00 25.19	+51 26 01.5	16.5	G	13.03.97	2400	IV	
1303+536	13 03 30.90	+53 38 11.2	17.0	DA	06.04.91	150	II	
1303+565	13 03 57.21	+56 31 39.2	17.0	DA:	26.04.87	780	II	
1304+541	13 04 27.57	+54 06 09.8	17.0	DA	02.04.91	780	II	
1305+538	13 05 21.41	+53 51 53.3	17.5	QSO	18.05.93	809	II	
1306+563	13 06 25.52	+56 21 36.5	17.0	sdB	02.04.91	660	II	
1307+562	13 07 05.18	+56 13 35.5	18	QSO	17.05.93	1215	II	
1309+544	13 09 42.68	+54 27 00.6	17.0	DA+K	10.04.91	279	II	
1309+511	13 09 58.37	+51 09 23.5	16.0	DA:	06.03.92	469	II	
1311+504	13 11 31.65	+50 24 27.2	16.0	HBB	11.04.96	900	IV	
1311+579	13 11 37.45	+57 54 09.8	16	Cont	06.03.97	2400	IV	
1314+537	13 14 36.41	+53 43 03.9	16.5	DA:	06.03.89	540	II	
1315+605	13 15 20.15	+60 31 20.2	18	QSO	17.02.94	1800	III	
1317+526	13 17 24.19	+52 39 19.3	17.0	DA	04.04.92	660	II	
1319+555	13 19 17.59	+55 32 25.1	17.0	DA	26.02.88	660	II	
1321+496	13 21 54.85	+49 38 07.7	12.0	sdB	20.05.93	310	II	
1330+580	13 30 06.44	+58 00 34.2	16.5	DB	20.03.91	155	II	
1337+570	13 37 55.75	+57 00 15.0	17.5	DA	20.03.91	410	II	
1338+551	13 38 48.77	+55 11 32.6	17.5	QSO	17.05.93	1280	II	
1339+606	13 39 16.28	+60 41 19.7	17.0	DA	24.03.92	660	II	
1340+575	13 40 39.15	+57 35 23.7	17.5	DA:	15.04.91	999	II	
1345+592	13 45 35.77	+59 17 28.6	16.5	QSO	16.04.96	1200	IV	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
1347+539A	13 47 31.11	+53 58 13.4	16	NHB	10.04.96	900	IV	
1352+542	13 52 44.70	+54 15 58.9	17.5	F	10.04.91	320	II	
1353+538	13 53 25.69	+53 49 22.1	11.0	sdOA	06.03.89	120	II	
1356+564	13 56 06.80	+56 25 36.5	17.0	DA	06.03.92	235	II	
1359+506	13 59 07.36	+50 39 56.4	17.0	HBB	15.04.91	416	II	
1359+521B	13 59 22.28	+52 09 59.3	16.5	NHB	06.03.92	186	II	
1400+526	14 00 40.59	+52 36 41.5	15.5	HBB	11.04.96	480	IV	
1402+529	14 02 50.39	+52 57 47.7	17.0	F:	11.07.91	829	II	
1403+535	14 03 55.48	+53 30 09.1	17	sd	14.04.96	1800	IV	
1407+521	14 07 46.44	+52 08 07.6	17.0	DA	24.03.92	780	II	
1411+546B	14 11 35.24	+54 37 40.5	17.0	Cont	20.03.91	630	II	CBS 259†
1412+542	14 12 37.29	+54 17 45.5	16.5	DA	28.02.92	167	II	CBS 260†
1415+499	14 15 35.36	+49 55 17.9	17.5	NHB	12.04.96	1800	IV	CSO 627†
1415+573	14 15 35.75	+57 21 06.3	16.5	NHB	28.02.92	160	II	
1416+519	14 16 21.20	+51 57 43.6	18.0	DA	28.02.92	355	II	
1417+510	14 17 24.32	+51 00 44.6	17.5	QSO	11.02.97	600	III	
1417+514	14 17 51.53	+51 28 28.1	18	QSO	04.06.94	902	II	CSO 632†
1418+524	14 18 36.62	+52 29 30.7	17.0	DA:	28.02.92	157	II	CBS 264†
1422+589B	14 22 27.88	+58 58 49.2	17.0	G	28.02.92	222	II	
1422+497	14 22 53.15	+49 43 29.5	16.0	DA	06.04.92	470	II	CSO 645†
1423+500	14 23 13.15	+50 00 59.1	18	QSO	04.06.94	611	II	CSO 646†
1424+502B	14 24 41.74	+50 16 13.5	18	QSO	17.02.94	683	II	CSO 647†
1425+578	14 25 59.61	+57 52 34.9	17.5	HBB	19.05.93	240	II	
1426+574	14 26 53.47	+57 24 20.0	17.5	F	15.04.91	485	II	
1428+490A	14 28 07.49	+49 01 53.6	17.5	sdB	20.05.93	170	II	CBS 270†
1428+567	14 28 24.47	+56 45 03.6	16.0	sdB	11.04.91	1022	II	
1428+490B	14 28 34.16	+49 04 55.2	14.0	sdB	20.05.93	122	II	CBS 272†
1429+513	14 29 04.32	+51 20 43.9	17.5	DA	13.04.96	2400	IV	CSO 662†
1430+499	14 30 46.03	+49 57 20.1	17.5	NHB:	12.03.97	3600	IV	
1432+507	14 32 46.66	+50 42 28.0	16.5	NHB	14.04.96	1800	IV	
1432+504	14 32 47.28	+50 24 07.5	17.0	F	05.04.92	780	II	
1433+510	14 33 32.49	+51 05 25.8	17.0	DA	05.04.92	720	II	
1434+592B	14 34 56.43	+59 16 57.1	17.5	F	14.05.85	780	II	
1435+500A	14 35 04.03	+50 05 54.5	17.5	QSO	04.06.94	760	II	CSO 673†
1437+526	14 37 54.89	+52 47 39.7	17.0	Pec.*	06.03.97	1200	IV	
1438+602B	14 38 19.11	+60 15 38.8	17.0	NHB	05.04.92	720	II	
1440+562	14 40 49.19	+56 15 12.4	17.5	Cont	20.03.91	328	II	
1441+514	14 41 13.82	+51 29 57.4	17.0	NHB	05.04.92	720	II	CBS 280†
1442+495	14 42 03.82	+49 30 13.4	17.0	sdB	05.04.92	720	II	CBS 282†
1447+552B	14 47 42.43	+55 16 53.0	18.04	QSO	11.04.97	3600	IV	
1449+537	14 49 34.11	+53 46 11.6	19.35	QSO	11.02.97	1200	III	RGBJ1451+535§
1449+513	14 49 41.34	+51 23 05.2	16.0	DA	06.03.92	150	II	CBS 289†
1451+494	14 51 57.86	+49 26 01.2	17.5	NHB:	11.04.97	3600	IV	
1451+606	14 51 58.13	+60 36 20.4	17.5	G	20.03.91	320	II	
1452+553	14 52 48.57	+55 23 58.4	16.0	DA	28.01.90	600	II	CBS 295†
1453+506	14 53 10.14	+50 41 16.6	19.04	QSO	12.04.97	3600	IV	
1454+506	14 54 10.91	+50 39 29.2	17.84	DA	14.04.97	3600	IV	CSO 700†
1500+520	15 00 34.06	+52 03 50.1	17.0	DA	10.07.91	560	II	CSO 715†
1500+531	15 00 49.35	+53 10 37.3	17.5	NHB	12.04.97	3600	IV	
1506+498	15 06 53.10	+49 52 13.5	17	sd	12.03.97	3600	IV	CBS 302†
1506+496	15 06 19.60	+49 37 11.4	16.0	G	06.04.92	382	II	CSO 724†
1507+577	15 07 12.81	+57 43 55.0	18.0	Cont	18.03.86	780	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
1510+526	15 10 21.92	+52 36 53.7	17.64	QSO	06.03.97	1800	IV	
1510+586	15 10 57.56	+58 36 07.0	17.0	G	19.02.82	660	I	
1514+590	15 14 35.99	+59 05 20.4	17.5	DA	06.04.91	200	II	
1516+494	15 16 54.27	+49 29 53.9	17.5	DA	14.04.97	3600	IV	CSO 737†
1516+519	15 16 14.18	+51 55 40.0	17.0	sd	06.04.91	250	II	CBS 310†
1517+553	15 17 27.36	+55 22 44.5	17.5	HBB	27.06.89	720	II	
1520+545	15 20 50.64	+54 33 32.5	17.5	DA	06.04.91	246	II	CSO 745†
1522+545	15 22 35.48	+54 33 29.4	17.0	DA	27.06.89	720	II	CSO 750†
1522+551	15 22 48.83	+55 11 22.4	17.5	DA	06.04.91	333	II	
1525+494	15 25 43.14	+49 28 55.2	18.90	QSO	19.05.93	900	II	CSO 757†
1527+598	15 27 44.04	+59 50 49.4	17.0	HBB	05.04.92	720	II	
1527+612B	15 27 53.92	+61 12 04.6	17.5	DA	22.02.82	780	I	
1529+527	15 29 38.07	+52 46 04.9	17.51	QSO	14.04.97	3600	IV	CSO 765†
1530+516	15 30 59.29	+51 40 17.3	17	NHB	11.04.96	600	IV	
1532+547	15 32 52.91	+54 43 43.6	16.0	DA	26.06.89	480	II	
1536+520	15 36 01.41	+52 01 12.9	17.0	DBA	05.04.92	540	II	
1539+550	15 39 51.18	+55 00 15.8	16.0	sdB	26.06.89	480	II	
1540+505	15 40 34.55	+50 35 04.0	17.0	DB	05.04.92	540	II	
1541+495	15 41 49.10	+49 32 04.9	17.0	DA	05.04.92	540	II	
1542+581	15 42 44.53	+58 10 45.1	17.5	Cont	11.04.81	720	I	
1542+517	15 42 51.33	+51 42 33.6	17.0	DA	05.04.92	660	II	
1545+592	15 45 54.98	+59 13 22.3	17.5	G	19.05.93	240	II	
1552+601	15 52 00.95	+60 10 48.6	18.5	F	12.02.91	840	II	
1554+496B	15 54 11.96	+49 40 56.3	17.0	NHB	06.04.92	720	II	
1554+582	15 54 15.80	+58 15 20.6	17.5	sd	09.04.91	318	II	
1556+605	15 56 01.24	+60 32 51.1	17.0	sdB	06.04.92	660	II	
1600+587	16 00 23.68	+58 42 57.5	15.0	F	06.03.92	146	II	
1600+575	16 00 52.32	+57 35 39.8	18.5	DA:	14.09.88	900	II	
1604+606	16 04 53.70	+60 41 42.7	17.0	G	08.07.91	548	II	
1612+554	16 12 09.64	+55 28 58.2	16.5	DA	26.06.89	540	II	
1614+551	16 14 25.11	+55 11 43.5	17.0	sd:	26.06.89	660	II	
1615+597	16 15 51.45	+59 46 12.2	17.0	G	10.07.91	472	II	
1619+606	16 19 51.12	+60 40 37.0	17.5	DAF	22.02.82	720	I	
1621+564	16 21 36.19	+56 29 38.3	17.0	sdB	20.09.88	660	II	
1621+558	16 21 47.30	+55 51 12.2	17.0	G	06.04.92	660	II	
1622+587	16 22 05.88	+58 47 30.0	17.5	DB	14.05.85	780	II	
1629+601	16 29 08.97	+60 06 10.6	18.5	DA:	10.04.81	900	I	
1629+590	16 29 38.75	+59 04 28.7	17.5	HBB	19.09.90	720	II	
1642+515	16 42 16.23	+51 30 28.6	16.5	sdB-O	06 03 92	260	II	
1642+567	16 42 32.81	+56 42 41.2	17.5	DA	16.10.90	720	II	
1643+582	16 43 38.59	+58 12 48.9	18.0	G	19.09.90	840	II	
1655+588	16 55 36.83	+58 52 44.9	16.5	sdB	26.04.84	540	II	
1655+591	16 55 44.41	+59 09 21.8	16.5	sd	17.04.97	3600	IV	
1655+589	16 55 59.37	+58 56 41.5	16.5	HBB	15.04.97	3600	IV	
1656+556	16 56 13.51	+55 40 17.1	16.5	sdO:	15.04.96	2400	IV	
1657+584	16 57 52.25	+58 28 00.0	17.5	DA	26.09.90	780	II	
1709+535	17 09 07.62	+53 30 24.3	12.5	DA:	05.04.90	120	II	
1712+575	17 12 02.64	+57 34 04.8	18.5	G:	19.09.90	900	II	
1712+578	17 12 20.86	+57 53 31.2	17.0	sdB	30.05.87	720	II	
1712+593B	17 12 25.42	+59 23 00.8	17.5	sdB	14.05.85	780	II	
1712+493	17 12 32.60	+49 19 34.3	14.5	Pl.Neb.	11.04.96	600	IV	
1715+604	17 15 02.64	+60 28 08.9	16.5	NHB	26.04.87	660	II	

Table 1—Continued

SBS designation	R.A. 1950.0	Dec. 1950.0	m pg	Spect. type	Date of obs.	Exp. sec	Instru-ment	Other designation
1716+581	17 16 33.99	+58 09 06.6	16.96	QSO	16.04.96	1200	IV	
1717+583	17 17 03.13	+58 18 19.3	17.38	QSO	16.04.96	1200	IV	RXJ1717.8+5815‡

‡ Bade et al. 1995.

§ Laurent-Muehleisen et al. 1998.

† Sanduleak & Pesch 1989.

Note. — I – SAO 6 m telescope (UAGS), II – SAO 6 m telescope (IPCS), III – SAO 6 m telescope (LSS), IV – GHO 2.1 m telescope (LFOSC).

Table 2. The results on the number of objects of different classes

Type	QSO	WD	sd	sdB	HBB	NHB	F	G	Cont.	Comp.	CV	Pl.Neb.	Pec.*
Number	35	142	26	29	10	16	54	25	17	2	4	1	2

Table 3. Observed Emission Lines and Redshifts for the new QSOs

Object	Redshift	λ_{obs}	Identification	Object	Redshift	λ_{obs}	Identification
0801+581	0.440	4029	MgII 2798	1201+517	0.803	5044	MgII 2798
		6255	H_γ 4340	1234+530	1.295	4381	CIII] 1909
0806+505	1.205	6169	MgII 2798			6421	MgII 2798
		4209	CIII]1909	1251+572	1.273:	6360	MgII 2798
0839+541	0.216	3405	MgII 2798	1251+513	0.755:	4910	MgII 2798
		4168	[NeV] 3425	1258+585	1.417	3745	CIV 1549
		4535	[OII] 3727			4612	CIII] 1909
		4708	[NeIII] 3869	1305+538	0.803	5045	MgII 2798
		5281	H_γ 4340	1307+562	1.616	4053	CIV 1549
		5916	H_β 4861			4992	CIII] 1909
		6035	[OIII] 4959	1315+605	1.981	4619	CIV 1549
		6095	[OIII] 5007			5688	CIII] 1909
0842+584	0.864	3555	CIII] 1909	1338+551	1.637	4085	CIV 1549
		5215	MgII 2798			5030	CIII] 1909
0916+513	0.545	4325	MgII 2798	1345+592	0.768	4946	MgII 2798
		5977	[NeIII] 3869	1417+510	1.415	4600	CIII] 1909
		6105	[NeIII] 3968			6765	MgII 2798
0937+503	1.884	4061	SiIV 1406	1417+514	1.305:	3570	CIV 1549
		4465	CIV 1549			4400	CIII] 1909
		5047	NIII] 1750	1423+500	2.220	2700	Ly_α/NV 1216
1016+510	1.314	4415	CIII] 1909			4990	CIV 1549
		6471	MgII 2798	1424+502B	2.322	4040	Ly_α/NV 1216
1025+576	0.190	4705	H_ϵ 3970			4651	SiIV/OIV] 1400
		4865	H_δ 4102			5145	CIV 1549
		5160	H_γ 4340	1435+500A	1.550	3950	CIV 1549
		5776	H_β 4861			4868	CIII] 1909
		5887	[OIII] 4959	1447+552B	0.366	5935	H_γ 4340
		5940	[OIII] 5007			6629	H_β 4861
1047+557B	0.331	3730	MgII 2798	1449+537	0.435	4012	MgII 2798
		5180	H_8 3889			6228	H_γ 4340
		5280	H_ϵ 3970			6975	H_β 4861
		5463	H_δ 4102	1453+506	2.321:	5145	CIV 1549
		5783	H_γ 4340			6365	CIII] 1909
		6477	H_β 4861	1510+526	1.134	4073	CIII] 1909
		6602	[OIII] 4959			5970	MgII 2798
		6663	[OIII] 5007	1525+494	1.602	4030	CIV 1549
1058+561	0.935	3693	CIII] 1909			4966	CIII] 1909
		5415	MgII 2798	1529+527	1.360	4495	CIII] 1909
1116+518	0.103	4523	H_δ 4102			6618	MgII 2798
		4787	H_γ 4340	1716+581	0.580:	4430	MgII 2798
		5362	H_β 4861	1717+583	0.311	5375	H_δ 4102
		5470	[OIII] 4959			5704	H_γ 4340
		5523	[OIII] 5007			6000	FeII 4570
1158+538	1.175	4152	CIII] 1909			6380	H_β 4861
		6085	MgII 2798			6560	[OIII] 5007